NARRAGUAGUS RIVER FLOOD CONTROL

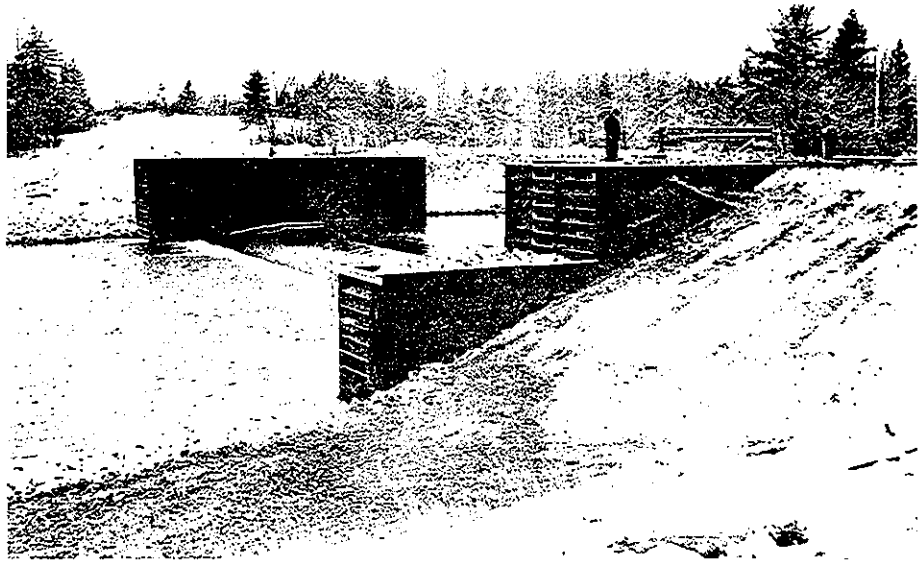
OPERATION AND MAINTENANCE MANUAL

FOR

ICE - JAM FLOOD PROTECTION WORKS

CHERRYFIELD, MAINE

NARRAGUAGUS RIVER



U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS WALTHAM, MASS.

FEBRUARY 1962

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OPERATION

AND

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MANUAL

U.S. Army Engineer Division, New England
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FOREWORD

The successful functioning of Ice-Jam Flood Protective works is not assured solely by construction of a system of adequate dikes, embankments, crib abutments and spillway, stoplogs and other appurtenant structures. If the system is to perform the functions for which it was designed, it must be carefully maintained during periods of normal river stages and properly operated during ice-jam flood periods.

The need for proper maintenance cannot be too highly stressed in view of the large damages which may be incurred through failure of a critical element in ice-jam flood time, caused by deterioration or damage that would have been eliminated by proper maintenance.

Necessary maintenance and proper operation require that responsible local persons have a thorough understanding of the functions of the various units of the system, and the best methods of maintaining the system and operating it during flood emergencies. It is the purpose of this manual to provide complete information so that all parties may know their responsibilities in maintaining and operating the protective works in accordance with existing Flood Control Regulations of the Secretary of the Army as amplified by this manual.

Flood control for high river discharges is not a basic function of this project. The protective works at Cherryfield have been designed solely for a flood produced by ice, where the flood stage is primarily a function of the magnitude and damming effect of the ice-jam in addition to the discharge. On this basis the Flood Control Regulations for Maintenance and Operation of Flood Control Works quoted herein which were approved by the Acting Secretary of War on 9 August 1944 have been utilized. Upon establishment of the Department of Defense, the improvement of rivers and harbors and other waterways for flood control and other purposes, formerly under the jurisdiction of the Secretary of War, became the responsibility of the Secretary of the Army. Reference herein to the Secretary of Wa

and War Department shall be construed to mean, respectively, the Secretary of the Army and Department of the Army. Where reference is made to the District Engineer in the Regulations included in this manual, it shall be construed to mean the Division Engineer, U.S. Army Engineer Division, New England, Waltham, Massachusetts.

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SECTION I

INTRODUCTION

1. AUTHORIZATION

Construction of a local protection project on the Narragaugas River at Cherryfield, Maine was authorized by the Chief of Engineers on 1 December 1960 pursuant to authority contained in Section 205 of the 1948 Flood Control Act, amended by Section 212 of the 1950 Flood Control Act and further amended by Public Law 685, 84th Congress, 2nd Session, approved 11 July 1956.

2. LOCATION

The project is located about 45 miles east of Bangor, Maine on the Narragaugus River about one mile above the center of Cherryfield, Washington County, Maine.

3. DESCRIPTION OF PROJECT

The project consists of a dam and reservoir for the retention of ice which heretofore has caused serious damage from ice-jam flooding in Cherryfield. The dam consists of a rock-filled timber crib spillway and abutments with a non-overflow earth and rock-fill section at each end of the dam. At each end of the spillway, sluiceways with stoplogs are provided for maintenance purposes. Rock-filled timber abutments flank each side of the spillway forming the sidewalls of the spillway and retaining the embankment sections. A Denil type fish ladder has been built into the east abutment of the dam to accommodate Atlantic Salmon and other migratory fish.

4. PROTECTION PROVIDED

The area protected is comprised of residential, commercial and business property, located downstream of the dam and along both banks of the Narragaugas River, through Cherryfield Village. The construction of the rock-filled timber crib and earth dam creates an artificial lake of sheet ice, which will hold potential ice-jams in the reservoir, and uninhabited area. The reservoir will impound and hold the ice until it rots away in the spring, or at least delay its downstream movement until after the breakup of the ice in the reaches of tidal water between Cherryfield and Millbridge.

5. CONSTRUCTION HISTORY

Construction of the project was initiated on 12 June 1961 and was completed in December 1961. The project was constructed by the Sanders Construction Corporation of Portland, Maine. Approximate quantities of materials used are as follows: excavation - 6800 cubic yards, earthfill - 4000 cubic yards, stone slope protection - 3000 cubic yards, gravel bedding - 760 cubic yards, crushed stone - 820 cubic yards, treated timber cribbing - 205 M.F.B.M., treated and untreated planking - 44 M.F.B.M., steel sheet pilings - 1950 square feet, and other miscellaneous material.

6. PLANS

A reduced size set of drawings showing the project as actually constructed is included in Appendix D.

SECTION II

LOCAL COOPERATION REQUIREMENTS

7. FLOOD CONTROL ACTS

Section 3 of the Flood Control Act approved June 22, 1936 (Public Law No. 738, 74th Congress) provides "That hereafter no money appropriated under authority of this Act shall be expended on the construction of any project until States, political subdivision thereof, or other responsible local agencies have given assurances satisfactory to the Secretary of War that they will:

(a) Provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project;

(b) Hold and save the United States free from damages due to the construction works;

(c) Maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of War."

Section 212 of the Flood Control Act of 1950, pursuant to the provisions of which section construction of the Cherryfield Local Protection Project on the Narragaugus River was authorized by the Chief of Engineers, states that "The provision of local cooperation specified in Section 3 of the Flood Control Act of June 22, 1936, as amended, shall apply."

Public Law 685 amended Section 212 of the Flood Control Act of 1950 to increase the statutory limitation to $400,000. Assurances were also required that local interests agree to pay all construction costs in excess of $400,000, if required, to provide a complete and effective project. No cash contribution to the project was required.

8. ASSURANCES

Assurances were received from the Town of Cherryfield, signed by the Selectmen, and from the State of Maine, signed by the Governor and the Executive Council of the State of Maine. The latter assurance was provided to underwrite the requirement to hold and save the United States free from damages due to the construction works. Copies of the assurances of the Town of Cherryfield and the State of Maine are included in Appendix B.

SECTION III

GENERAL REGULATIONS

9. PURPOSE OF THIS MANUAL

The purpose of this Manual is to present detailed information to be used as a guide in complying with "Flood Control Regulations - Maintenance and Operation of Flood Control Works" as approved by the Acting Secretary of War on 9 August 1944, and published in this volume as Appendix A. In executing assurances of local cooperation, the Town has agreed to maintain and operate the completed works in accordance with these regulations. The regulations are intended to cover all local protection projects constructed by the Department throughout the United States, are general in nature, and obviously cannot give detailed instructions for the maintenance and operation of a specific project. The details set forth in this Manual for maintenance and operation of the project are intended to supplement the regulations to permit obtaining all the benefits and protection against ice-jam floods for which the project was designed. Failure to maintain and operate the project as required by the regulations and as detailed herein can cause severe property losses and loss of life and can result in an irreparable loss of confidence in the flood protection system by citizens who have invested their funds on the basis of the protection which it provides.

10. GENERAL RULES AND REGULATIONS

Paragraph 208.10(a) of the regulations prescribed by the Secretary of War gives general rules for the maintenance and operation of structures and facilities constructed by the United States for local flood protection. Applicable portions are quoted below to avoid the necessity for cross reference and are further defined by remarks under each quotation.

"(1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits."

These requirements cannot be overstressed, and the Town authorities must make adequate provisions for funds, personnel, equipment, and materials to allow for the proper maintenance and operation of the protective works.

"(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent", who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during the periods of low water, all without cost to the United States."

The committee should be composed of competent members, preferably men experienced in engineering or construction work of a nature similar to the flood protection works. The committee must be given broad authority to carry out its responsibilities. The name, address, and office and home telephone numbers of the Superintendent, and any changes thereof, shall be promptly furnished the Division Engineer.

"(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times."

Three men should be available to meet any ordinary emergency that may occur during flood periods. Borrow pits for embankment gravel and rock materials should be secured and sources of additional supplies of materials, tools, and equipment should be well established in order that these articles can be obtained quickly in case of an emergency.

"(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities."

"(5) No improvement shall be passed over, under or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representatives that such improvement, excavation, construction or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in

accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work."

No improvement shall be passed under or through the stone filled wood crib and spillway. Any contemplated improvements or alterations as outlined above must be submitted to the Corps of Engineers, Waltham, Mass., and the approval of the Division Engineer obtained prior to the Town authorizing the work. All requests for approval shall be in writing and complete drawings in duplicate, one set of which shall be in reproducible form, must be submitted along with a full description of the work intended. The Town will be held responsible for obtaining prior approval from the Corps of Engineers for any improvements or alterations proposed by itself, private parties or any public parties. The Town shall furnish the Division Engineer as-built drawings in duplicate of the completed work.

"(6) It shall be the duty of the Superintendent to submit a semiannual report to the District Engineer covering inspection, maintenance and operation of the protective works."

"(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works."

The Division Engineer or his representatives will make periodic inspections of the protective works to determine if the project is being properly maintained and operated by the Town.

"(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made."

The Town should maintain the facilities and keep them in good repair and not wait for the Division Engineer to call such matters to its attention. Upon request, the Division Office will advise the Town how to make any repairs to the facilities.

"(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods."

"(10) The Corps of Engineers will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations."

The flood control committee should familiarize itself with the contents of this manual. The Town authorities are encouraged to call on the Division Office of the Corps of Engineers for any additional advice or instructions required by them in carrying out the Town's obligations for maintaining and operating the flood protection facilities.

11. MAINTENANCE

a. The word "maintenance" as used in this manual applies to the upkeep, repair and care of the work constructed by the United States and turned over to the Town of Cherryfield. If the work is neglected there will be deterioration and possible failure in flood time when there is dire need of dependable protection.

b. Satisfactory and dependable operation depends on constant maintenance. The organization that performs maintenance will be familiar with various parts of the system and will be in a position to use them effectively in time of stress.

c. Maintenance includes regular inspection of the entire system. The purpose of an inspection is to detect any deterioration or faulty operation that indicates a need for repair or replacement.

d. Each of the major features of the project will be discussed separately with respect to the points which, based on experience with special project features, require special attention.

12. OPERATION

Operation in this manual refers to the actual use of the various features of the protection works during flood periods. It is intended that the procedure outlined herein will be sufficient to insure protection from ice-jam floods. However, advice relative to operation may be obtained at any time from the Engineering Division of the New England Division Office.

13. REPORTS

a. The regulations prescribed by the Secretary of War call for semiannual reports to be submitted by the Superintendent to the Division Engineer, covering inspection, maintenance and operation. Inspection of the flood protective facilities shall be made immediately prior to ice-jam flood seasons, immediately following floods, and otherwise at intervals not exceeding 90 days as required by the regulations.

b. To assist the Superintendent in making his inspections and reports, a sample form has been prepared and is included in Appendix C. The Superintendent shall have additional copies printed for use in submitting his reports.

c. The semiannual reports should be submitted in triplicate to the Division Engineer each February and August. The reports will be submitted in letter form with copies of the inspection forms covering the inspections made during the period of the report. The reports shall cover the following points:

(1) A description of the maintenance work performed in the preceding six months.

(2) The number and classification of men working on maintenance, regularly and intermittently.

(3) Description of any work performed by contract on the repair or improvement of the project.

(4) Description of use or operation of the system during the period being reported.

(5) Suggestions relative to public cooperation and comments concerning public sentiment on the protection obtained are considered pertinent and desirable data for inclusion in the report, but such data are not required.

SECTION IV

EARTH FILL DAM

14. DESCRIPTION

Plate No. 2 shows a general layout of the low rock-filled timber crib and earth fill dam. On the landward side of the rock-filled timber crib abutments, an earth and rock-filled section of the dam has been built to tie the abutments into high ground. On the east bank of the river this section is about 135 feet long, and on the west bank it is about 180 feet long. At each end of the spillway a 3.5 foot sluiceway with stoplogs is provided for maintenance purposes. Rock-filled timber crib abutments flank each side of the spillway forming the side walls of the spillway and retaining the embankment sections.

The upstream faces of the compacted earth fill core of the dam are constructed on a slope of 2 feet horizontal to 1 foot vertical and are protected with stone placed 2 feet in thickness on a 12-inch gravel bedding. The downstream face is on a slope which varies from 2 horizontal and 1 vertical, to $2\frac{1}{2}$ horizontal and 1 vertical and is protected with crushed stone having a minimum thickness of 12 inches.

15. MAINTENANCE

Periodic inspection shall be made of this structure by the Superintendent and appropriate maintenance measures taken to insure that facilities which function as a part of it will operate properly. Regulations, modified as applicable to this structure shall be followed to be certain that:

a. No unusual settlement, sloughing or material loss of grade or dam cross-section has taken place;

b. No caving has occurred on either the landside or riverside of the dam which might affect the stability of the dam;

c. No seepage, saturated areas or sand boils are occurring;

d. No revetment work or stone protection has been displaced, washed out or removed;

e. Access roads to and on the dam are being properly maintained;

f. There is no unauthorized grazing or vehicular traffic on the dam;

g. Encroachments are not being made on the dam, right-of-way, which might endanger the structure or hinder its proper functioning during times of emergency;

h. Measures shall be taken to exterminate burrowing animals which are nesting in the dam.

Such inspections shall be made immediately prior to the beginning of the ice-jam flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days; and such intermediate times as may be necessary to insure the best possible care of the dam. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections.

16. OPERATION

There are no operational requirements to be performed at the earth filled dam. Under severe flood conditions a continuous patrol of the dam shall be maintained to locate possible sand boils, scouring or unusual wetness of the downstream embankment slope, to ascertain both control dam abutments are secure and to be certain that:

(1) There are no indications of slides or sloughs developing;

(2) Wave wash or scouring action is not occurring;

(3) No low reaches along the bank exist which will permit water to bypass the control dam and erode abutments;

(4) No other conditions exist which might endanger the structure.

If any indication of scouring or erosion due to overflow is observed, soundings should be taken to determine its magnitude and progress. Sandbagging or dumped rock will generally afford the most practical means of combating this condition. Sandbags should be placed in the erosions in as effective a manner as possible, carrying the protection well above the action of the water. Sandbags used for this purpose require only about one-half cubic foot of material and should be sewed or tied. The aim is to obtain the maximum coverage with only sufficient weight to hold the sack in place.

SECTION V

ROCK FILLED ABUTMENTS AND SPILLWAY

17. DESCRIPTION

Rock-filled timber crib abutments have been constructed on both sides of the river, to tie the earth filled dam into the rock-filled timber cribbed spillway section. Upstream and downstream of the timber crib abutments stone slope protection has been provided to prevent scouring of bank and to protect the ends of timber crib abutments. At each end of the spillway, adjacent to the abutments, sluiceways with stoplogs have been provided for maintenance purposes. A Denil type fishway has been constructed integral with the east abutment. About 125 feet upstream of the spillway, are located three independent rock-filled timber cribs that will aid in anchoring the reservoir cover ice in place. The individual cribs are placed in an arched pattern from abutment to abutment.

The east non-overflow portion of the dam consists of a rock-filled timber crib abutment 24.5 feet high, 51 feet long and 18 feet wide, and an earth and rock-fill embankment section 135 feet long, with a maximum height of 18 feet and a top width of 14 feet. A Denil type fishway is incorporated in this abutment crib. Eight foot wide wingwalls project 14 feet upstream and 23 feet downstream from the main crib.

The west non-overflow portion of the dam consists of a rock-filled timber crib abutment 24.5 feet high, 66 feet long and 16 feet wide and an earth and rock-fill embankment section 180 feet long with a maximum height of 16 feet and a top width of 14 feet.

18. MAINTENANCE

Periodic inspection shall be made of these structures and appropriate maintenance measures taken as necessary to assure proper functioning. Be certain that:

a. The timber crib and planking is structurally sound and replaced as necessary and that intercepted debris has been removed and disposed.

b. That rock-fill has not been displaced or removed.

c. That timber planking and crib timber is properly secured.

d. Sluiceway including stoplogs and planking to be checked regularly for loose or broken plants, which are to be replaced immediately.

e. Care is being exercised to prevent the accumulation of trash and debris near the structures and that fires are not being built near the timber cribs.

19. OPERATION

There are no operational functions to be performed at the rock-filled abutments and spillway during ice-jam flood periods. The dam spillway has a fixed crest with sluiceway openings set at permanent elevations by means of stoplogs. The sluiceway crest and stoplog on the east side of the spillway is set 6" lower than the west to insure flow near the fishway during low river flow periods. The spillway weir set at elevation 57.0 feet m.s.l. will permit the development of 2 to 3 feet of sheet ice in the pool, which will act as a barrier to the upstream floating ice. In the event that moving ice begins to enter or cause damage to the fish ladder or its baffles, incorporated in the east abutment, the fishway gate which is otherwise left in an open position should be closed.

SECTION VI

DENIL TYPE FISHWAY

20. DESCRIPTION

A Denil type fishway, approved by the Maine Atlantic Sea Run Salmon Commission, has been constructed in the east abutment crib. The baffle portion of the passage has a length of 37'-4", with each baffle being 3'-6" wide and 7'-0" high. The flow or elevation of the passage would be at elevation 49.0 at the fishway entrance and 55.0 at the exit. A wood trash rack has been constructed at the upstream end. Immediately upstream of the trash rack provisions will be made by the Department of Inland Fisheries and Game to permit the installation and operation of a fish trap. A fishway sluice gate and hand operated hoist including all necessary accessories has also been provided and is located 4'-0" from the fishway exit. The sluice gate will, when closed, permit maintenance of the fishway as required otherwise the sluice gate will remain in an open position. Details of the Denil-fishway, sluice-gate and other appurtenances are shown on plate 4 of the plans included in Appendix D.

21. MAINTENANCE

Periodic inspection shall be made of this structure and appropriate maintenance measures taken to assure proper functioning. Be certain that:

(a) Timber baffles, guides and interior planking are structurally sound and replaced as necessary and that intercepted debris has been removed and disposed.

(b) Approach and egress channels are sufficiently clear of obstructions, debris, silt, shoals and fallen rock to permit the passage of fish.

(c) That timber baffles, guide and interior planking are properly secured.

22. OPERATION

There are no operational functions to be performed along the fishway during periods of ice-jam flooding. The closing of the fishway gate is advisable in the event that moving ice begins to enter the fishway and thereby damage its baffles or guides. Under normal conditions the fishway gate should remain in an open position.

SECTION VII

CHANNEL

23. DESCRIPTION

The channel constructed by the Corps of Engineer's consists of enlargement and minor realignment of the Narragaugus River channel, in the vicinity of the spillway and the excavation of a pilot channel 10'-0" wide on the bottom immediately downstream of the fish ladder. The pilot channel in addition to providing more water for migratory fish will help guide them toward the fish ladder. The channel bed and side slopes are protected by a 2'-0" thick bed of stone. The side slopes are laid on a 2 horizontal to 1 vertical slope, for a distance of about 87 feet. Beyond this point the channel is excavated in the old river channel about 4'-0"+ deep, with gravel covered side slopes on a slope of 2 horizontal to 1 vertical, for a distance of about 140 feet. Attention is invited to Plate No. 5 of Appendix D.

24. MAINTENANCE

Periodic maintenance shall be made of the river channel upstream and downstream of the timber abutments for a distance of about 200 feet. The Town of Cherryfield has agreed to include in its maintenance responsibility the channeled streambed downstream from the fishway. Determination of annual maintenance needs and supervision of maintenance work will be developed by the State of Maine Atlantic Sea Run Salmon Commission, in cooperation with the Town. Periodic inspection of the channel shall be made by the Superintendent to ascertain the following:

a. The channel is clear of debris, weeds and wild growth;

b. The channel is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;

c. Dumping of waste materials or any types of encroachment on the channel shall be prohibited and prompt steps shall be taken to remove or have removed any such encroachments;

d. The capacity of the channel or floodway is not being reduced by the formation of shoals;

e. Shoal areas should be removed but care should be exercised that slopes of the channel and existing banks are not undercut. Existance of shoal areas will be apparent from inspections during times of low flow;

f. Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

g. Rockfill slope protection must be maintained in good condition to resist erosion. Any loss of rock due to slides, erosion or vandalism must be promptly replaced.

25. OPERATION

There are no operational functions to be performed along the channel immediately upstream or downstream of the spillway or along the fishway channel during periods of ice-jam flooding. The improved channel and fishway shall be throughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, or other flood control structures repaired.

SECTION VIII

DRAWINGS AND SPECIFICATIONS

26. DRAWINGS AND SPECIFICATIONS

A complete set of plans and specifications was furnished the Town of Cherryfield, the State of Maine and other interested State Agencies at the time of initiation of construction of the project. A full-size set of plans showing the project as actually constructed was furnished the Town at the time of transmittal of this manual, reduced prints of these drawings are included in Appendix D.

A P P E N D I C E S

APPENDIX A

REGULATIONS OF THE

SECRETARY OF THE ARMY

TITLE 33—NAVIGATION AND NAVIGABLE WATERS

Chapter II—Corps of Engineers, War Department

PART 208—FLOOD CONTROL REGULATIONS

MAINTENANCE AND OPERATION OF FLOOD CONTROL WORKS

Pursuant to the provisions of section 3 of the Act of Congress approved June 22, 1936, as amended and supplemented (49 Stat. 1571; 50 Stat. 877; and 55 Stat. 638; 33 U. S. C. 701c; 701c–1), the following regulations are hereby prescribed to govern the maintenance and operation of flood control works:

§ 208.10 *Local flood protection works; maintenance and operation of structures and facilities*—(a) *General.* (1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent," who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities.

(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

(6) It shall be the duty of the superintendent to submit a semiannual report to the District Engineer covering inspection, maintenance, and operation of the protective works.

(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations.

(b) *Levees*—(1) *Maintenance.* The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

(i) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;

(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(iii) No seepage, saturated areas, or sand boils are occurring;

(iv) The drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(v) Drains through the levees and gates on said drains are in good working condition;

(vi) No revetment work or riprap has been displaced, washed out, or removed;

(vii) No action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

(viii) Access roads to and on the levee are being properly maintained;

(ix) Cattle guards and gates are in good condition;

(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

(xi) There is no unauthorized grazing or vehicular traffic on the levees;

(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days; and such intermediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent.

(2) *Operation.* During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(i) There are no indications of slides or sloughs developing;

(ii) Wave wash or scouring action is not occurring;

(iii) No low reaches of levee exist which may be overtopped;

(iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

(c) *Flood walls.*—(1) *Maintenance.* Periodic inspections shall be made by the Superintendent to be certain that:

(i) No seepage, saturated areas, or sand boils are occurring;

(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

(viii) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice.

(2) *Operation.* Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall.

(d) *Drainage structures*—(1) *Maintenance.* Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on

drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

(ii) *Inlet and outlet channels are open;*

(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

(iv) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

(2) *Operation.* Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

(e) *Closure structures*—(1) *Maintenance.* Closure structures for traffic openings shall be inspected by the superintendent every 90 days to be certain that:

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

(iii) All movable parts are in satisfactory working order,

(iv) Proper closure can be made promptly when necessary;

(v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each 3-year period. Trial erection of all closure structures shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial erection of sand bag closures is not required. Closure materials will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replaced immediately.

(2) *Operation.* Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

(f) *Pumping plants*—(1) *Maintenance.* Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery Adequate supplies of lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

(2) *Operation.* Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above-mentioned "Operating Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pump house sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood.

(g) *Channels and floodways* — (1) *Maintenance.* Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

(i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;

(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;

(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

(v) Riprap sections and deflection dikes and walls are in good condition;

(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

(2) *Operation.* Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired.

(h) *Miscellaneous facilities* — (1) *Maintenance.* Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior run-off during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor. (49 Stat. 1571, 50 Stat. 877; and 55 Stat. 638; 33 U.S.C. 701c; 701c–1) (*Regs. 9 August 1944, CE SPEWF*)

[SEAL] J. A. ULIO,
Major General,
The Adjutant General.

[F. R. Doc. 44–12285; Filed, August 16, 1944; 9:44 a. m.]

A-2

APPENDIX B

ASSURANCES OF LOCAL COOPERATION

1. Assurance of the Town of Cherryfield, Maine
2. Assurance of the State of Maine

OFFICE OF SELECTMEN
ASSESSORS AND OVERSEERS OF POOR
TOWN OF CHERRYFIELD, MAINE

ARTICLE# 43:

To see if the Town will vote to authorize the Board of Selectmen to sign the Required Conditions of Local Cooperation with the Federal Government for the construction of an Ice Control Dam on the Narraguagus River.

This vote was by a show of hands - It was unanimous but for one (1) dissenting vote.

A TRUE COPY : ATTEST

Kathleen Fickett
Town Clerk

ASSURANCE
OF THE
TOWN OF CHERRYFIELD
STATE OF MAINE

WHEREAS, Section 205 of the Flood Control Act approved 30 June 1948, amended by Section 212 of the Flood Control Act approved 17 May 1950 and further amended by Public Law 685, 84th Congress, 2nd Session authorizes the Secretary of the Army "to allot any appropriations heretofore or hereafter made for flood control, not to exceed $10,000,000. for any one fiscal year for the construction of small flood control projects not specifically authorized by Congress and not within area intended to be protected by the projects so authorized which come within the provisions of Section 1 of the Flood Control Act of June 22, 1936, when in the opinion of the Chief of Engineers such work is advisable: Provided, that not more than $400,000. shall be allotted for this purpose at any single locality from the appropriations for any one fiscal year: Provided further, that the provisions of local cooperation specified in Section 3 of the Flood Control Act of June 22, 1936, as amended, shall apply: and Provided further, that the work shall be complete in itself and not commit the United States to any additional improvements to insure its successful operation, except as may result from the normal procedure applying to projects authorized after submission of preliminary examination and survey reports"; and

WHEREAS, the Secretary of the Army has allotted funds for the design of low rock-filled timber crib dam to relieve ice-jam floods in the Narraguagus River at Cherryfield, Maine, and

WHEREAS, the construction work is to be prosecuted under the direction of the Secretary of the Army and the supervision of the Chief of Engineers, Corps of Engineers, United States Army; and

WHEREAS, such work is subject to the provisions of Section 3 of the Flood Control Act of 22 June 1936 which provides that no money will be expended on the construction of any project until States, political subdivisions thereof, or other responsible local agencies have given certain Assurances to the Secretary of the Army; and

WHEREAS, the Town of Cherryfield is desirous of the construction of this project.

NOW, THEREFORE, the Town of Cherryfield, Maine under authority of Chapter 90-A Section 8 Revised Statutes of Maine 1954 hereby assures the United States of America that it will:

(a) Provide without cost to the United States, all lands, easements, and rights-of-way necessary for the construction of the project.

(b) Hold and save the United States free from damages due to the construction works.

(c) Maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of the Army.

(d) Contribute all construction funds that are found to be necessary over and above the sum of $400,000. if such additional funds are required to provide for a complete and effective project.

IN WITNESS WHEREOF, the Town of Cherryfield, Maine, has executed the within Assurance through its Selectmen and has caused its Seal to be affixed hereto this 31 day of March 196/.

TOWN OF CHERRYFIELD

By Warren A Moore
Selectman

Robert Boyd
Selectman

Leslie W Randall
Selectman

ACCEPTANCE

19 APRIL 196/.

The within Assurance is hereby accepted for and on behalf of the United States of America.

By
SEYMOUR A. POTTER, JR.
Brigadier General, U. S. A.
Division Engineer

ASSURANCE

OF THE

STATE OF MAINE

WHEREAS, Section 205 of the Flood Control Act approved 30 June 1948, amended by Section 212 of the Flood Control Act approved 17 May 1950 and further amended by Public Law 685, 84th Congress, 2nd Session authorizes the Secretary of the Army "to allot any appropriations heretofore or hereafter made for flood control not to exceed $10,000,000.00 for any one fiscal year for the construction of small flood Control Projects not specifically authorized by Congress and not within area intended to be protected by the Projects so authorized which come within the provisions of Section I of the Flood Control Act of June 22, 1936, when in the opinion of the Chief of Engineers such work is advisable: Provided, that not more than $400,000. shall be allotted for this purpose at any single locality from the appropriations for any one fiscal year: Provided further, that the provisions of local cooperation specified in Section 3 of the Flood Control Act of June 22, 1936, as amended, shall apply: and Provided further, that the work shall be complete in itself and not commit the United States to anyadditional improvements to insure its successful operation, except as may result from the normal procedure applying to projects authorized after submission of preliminary examination and survey reports"; and

WHEREAS, the Secretary of the Army has allotted funds for the design of low rock-filled timber crib dam to relieve ice-jam floods in the Narragaugus River at Cherryfield, Maine, and

WHEREAS, the construction work is to be prosecuted under the direction of the Secretary of the Army and the supervision of the Chief of Engineers, Corps of Engineers, United States Army; and

WHEREAS, such work is subject to the provisions of Section 3 of the Flood Control Act of 22 June 1936 which provides that no money will be expended on the construction of any project until States, political subdivisions thereof, or other responsible local agencies have given certain Assurances to the Secretary of the Army; and

WHEREAS, the Governor of the State of Maine with the advice and consent of the Council is authorized to give Assurances that the State will hold and save the United States of America free from claims or damages resulting

from any such improvement project and to enter into an agreement with the United States of America for such purpose under Chapter 90-A, Section 8, II, C of Revised Statutes of Maine 1954.

NOW, THEREFORE, the Governor of the State of Maine, pursuant to said Public Law of the State of Maine, will hold and save the United States of America free from claims for damages due to the construction and subsequent maintenance of the works.

IN WITNESS WHEREOF, the Governor of the State of Maine, hereby executes the within Assurance for and on behalf of the State of Maine, and causes the Seal of the State of Maine to be hereto affixed this 13th day of April 1961.

STATE OF MAINE

By _____
Governor

Approved by:
Executive Council
of the State of Maine

_____ _____
_____ _____
_____ _____

ATTEST:

_____
Secretary of State

(SEAL OF SECRETARY OF STATE)

APPROVED AS TO FORM:

April 13, 1961

_____
Attorney General

ACCEPTANCE

17 April 1961

The within Assurance is hereby accepted for and on behalf of the United States of America.

By _____
SEYMOUR A. POTTER, JR.
Brigadier General, U. S. A.
Division Engineer

APPENDIX C

INSPECTION REPORT FORMS

SUPERINTENDENTS INSTRUCTION & INFORMATION

FLOOD PROTECTION SYSTEM INSPECTION REPORT

LOCATION

EARTH FILL DAM		LOCATION AND DESCRIPTION OF DEFICIENCIES
CAVING BANKS OR EROSION		
BURROWING ANIMALS		
SAND BOILS		
STONE SLOPES		
TRESPASSING		
ROCK FILLED TIMBER CRIBBING AND ICE HOLDING CRIBS		
TIMBER CRIBBING		
TIMBER CONNECTIONS		
FIRE DAMAGE		
FISHWAY		
FISHWAY GUIDES		
FISHWAY GATE		
STONE FILL		
SPILLWAY		
TIMBER CRIB		
TIMBER PLANKING		
STONE SLOPE PROTECTION		
SLUICEWAYS		
SLUICEWAY STOP LOGS		
FISHWAY CHANNEL		
SIDE SLOPES		

REMARKS

DATE	INSPECTED BY: TYPED NAME & TITLE	SIGNATURE

CHECK ITEMS IF FOUND SATISFACTORY, OTHERWISE LIST DEFICIENCIES - ITEMS NOT APPLICABLE MARK N.A.

NARRAGAUGUS RIVER FLOOD CONTROL

ICE-JAM FLOOD PROTECTION WORKS

CHERRYFIELD, MAINE

Project Superintendent

Home	Tel. No.	
Home Address		
City & State		
Place of Work	City	State
	Tel. No.	

Project Superintendent (Alternate in case Superintendent can not be reached)

Home	Tel. No.	
Home Address		
City & State		
Place of Work	City	State
	Tel. No.	

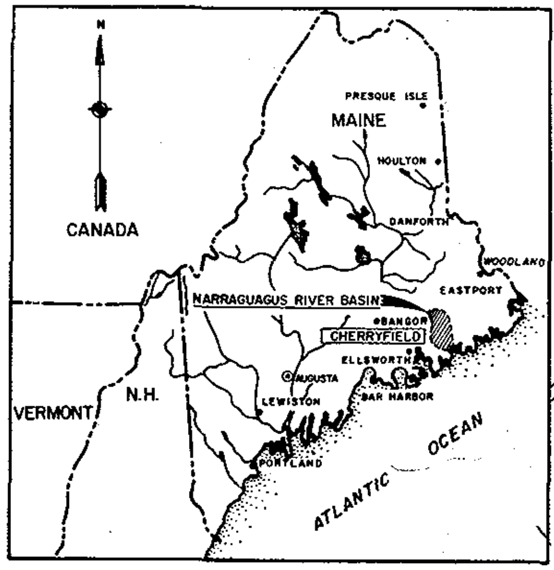
APPENDIX D

AS-BUILT DRAWINGS

Title	Plate No.
PROJECT PLAN AND INDEX	I
GENERAL PLAN AND PROFILE	II
SPILLWAY AND WEST ABUTMENT	III
FISH LADDER AND EAST ABUTMENT	IV
KEY PLAN, SECTIONS AND EXPLORATIONS	V
HYDROGRAPHS AND RATING CURVES	VI

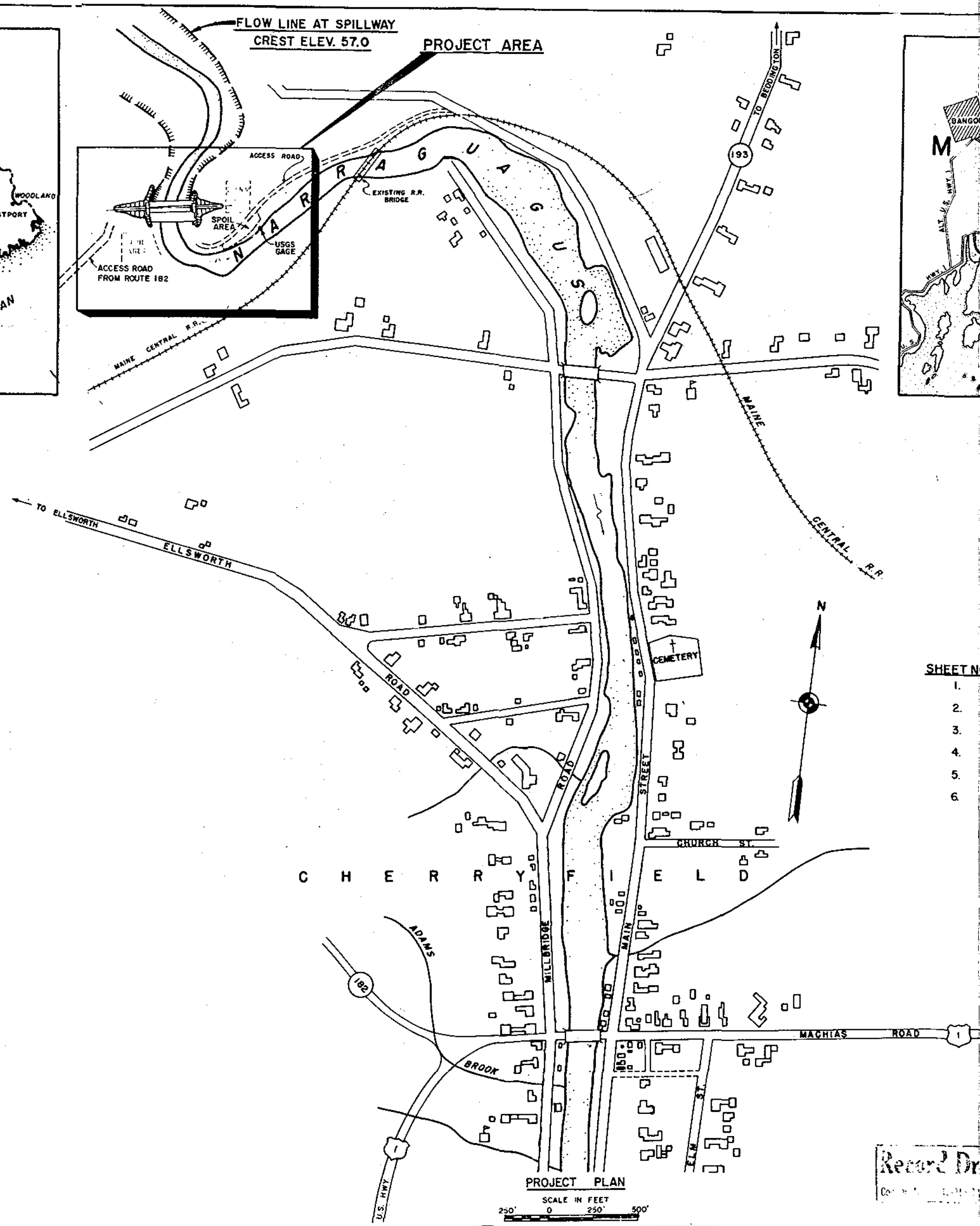
CORPS OF ENGINEERS

U. S. ARMY



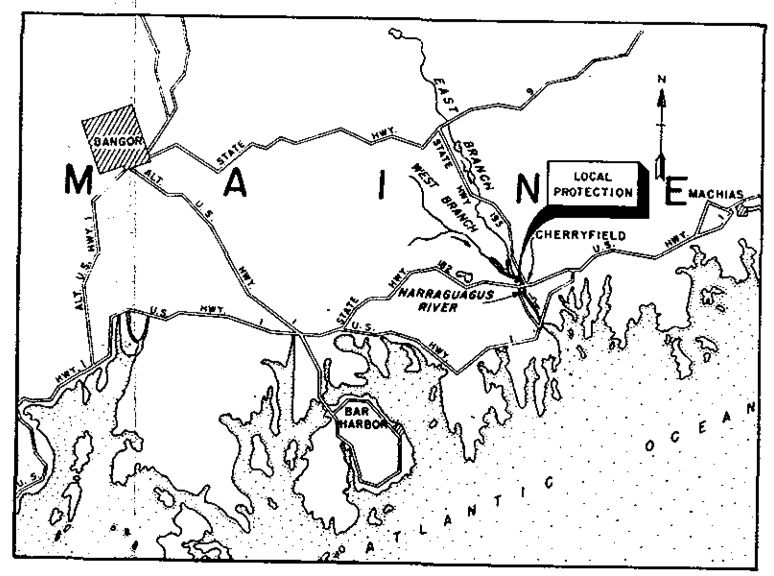
LOCATION MAP

SCALE IN MILES
20 10 0 20 40 60 80 100 MI.



PROJECT PLAN

SCALE IN FEET
250' 0 250' 500'



VICINITY MAP

SCALE IN MILES
5 0 5 15 25

INDEX TO DRAWINGS

SHEET NO.	TITLE	DRAWING NO.
1.	PROJECT PLAN AND INDEX	NA-1-1008
2.	GENERAL PLAN AND PROFILE	NA-1-1009
3.	SPILLWAY & WEST ABUTMENT	NA-1-1010
4.	FISH LADDER & EAST ABUTMENT	NA-1-1011
5.	KEY PLAN, SECTIONS & EXPLORATIONS	NA-1-1012
6.	HYDROGRAPHS & RATING CURVES	NA-1-1013

REVISION	DATE	DESCRIPTION
	2-6-62	Final field corrections

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY R.H.K. | DR. BY A.J.H. | CK. BY

PROJECT ENGINEER

SUBMITTED BY

CHIEF, SMALL PROJ. SECTION

APPROVAL RECOMMENDED

CHIEF, DESIGN BRANCH

APPROVAL RECOMMENDED

CHIEF, P. & R. BRANCH

NARRAGUAGUS RIVER FLOOD CONTROL
CHERRYFIELD, MAINE
LOCAL PROTECTION PROJECT
PROJECT PLAN AND INDEX
NARRAGUAGUS RIVER, MAINE

APPROVED
CHIEF, ENGINEERING DIVISION

DATE APRIL 1961

SCALE AS SHOWN | SPEC. NO. CIV. ENG. 19-016-61-27

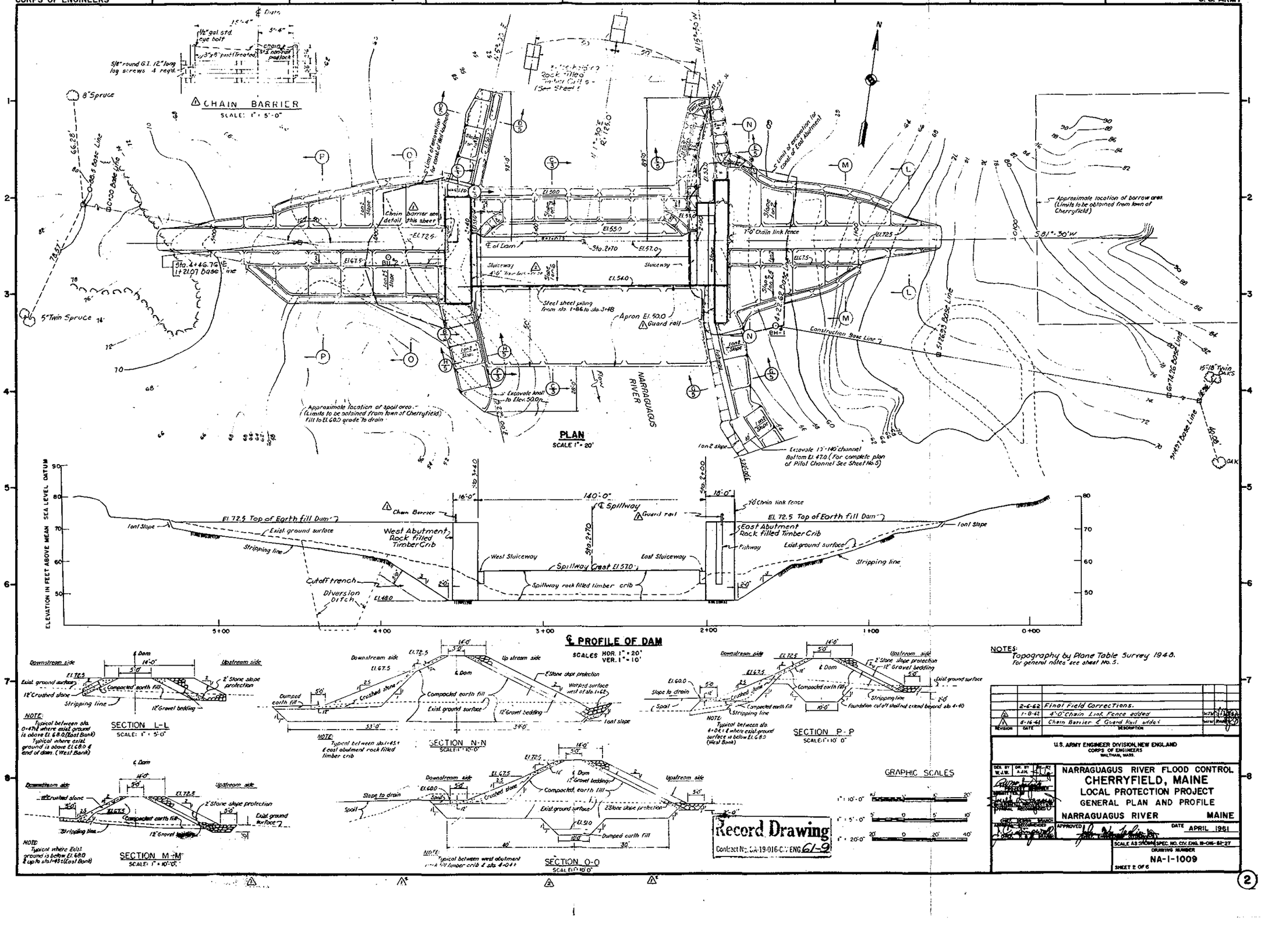
DRAWING NUMBER
NA-1-1008

SHEET 1 OF 6

Record Drawing
61-9

1

CORPS OF ENGINEERS — U.S. ARMY



℄ PROFILE OF DAM

SCALES HOR. 1" = 20'
VER. 1" = 10'

NOTES:
Topography by Plane Table Survey 1948.
For general notes see sheet No. 5.

REVISION	DATE	DESCRIPTION	INITIALS
	2-6-62	Final Field Corrections.	
1	1-8-62	4'-0" Chain Link Fence added	WTW
2	6-16-61	Chain Barrier & Guard Rail added	WTW

GRAPHIC SCALES
1" = 10'-0"
1" = 5'-0"
1" = 20'-0"

Record Drawing
Contract No. DA-19-016-C.V. ENG 61-9

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY W.J.W. | DR. BY A.J.N. | CH. BY

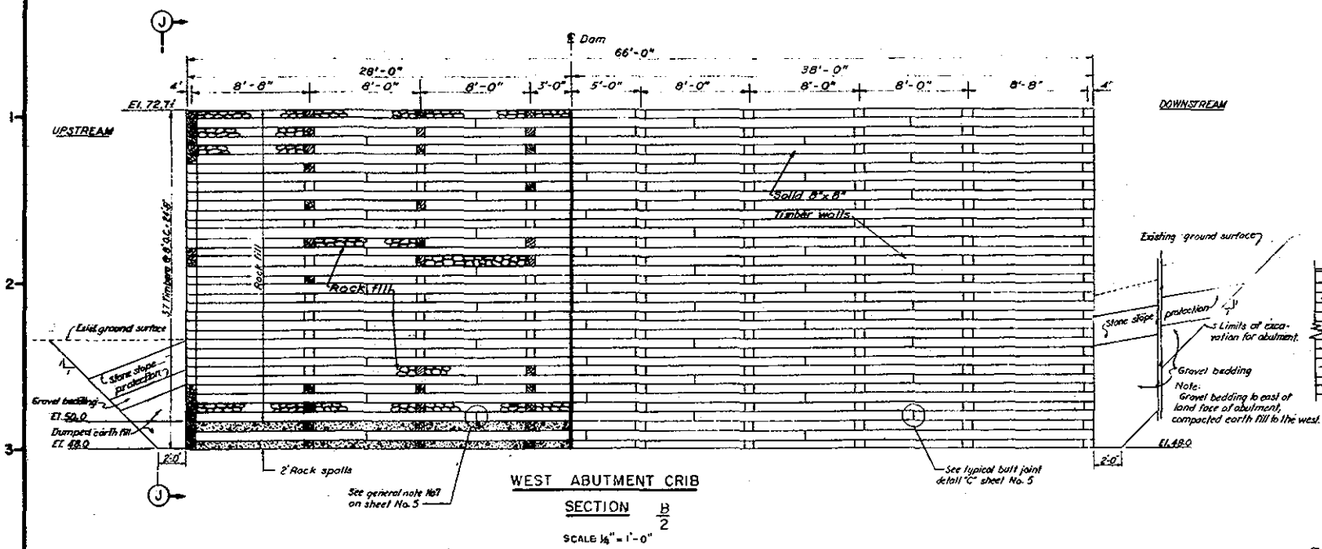
NARRAGUAGUS RIVER FLOOD CONTROL
CHERRYFIELD, MAINE
LOCAL PROTECTION PROJECT
GENERAL PLAN AND PROFILE
NARRAGUAGUS RIVER MAINE

APPROVED DATE APRIL 1961

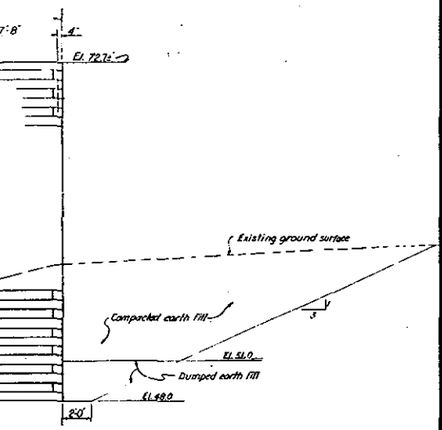
SCALE AS SHOWN SPEC. NO. CIV. ENG. 19-016-61-27
DRAWING NUMBER
NA-1-1009
SHEET 2 OF 6

2

CORPS OF ENGINEERS — U.S. ARMY

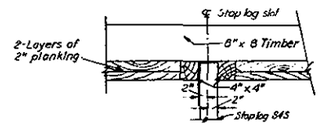


WEST ABUTMENT CRIB
SECTION $\frac{B}{2}$
SCALE 1/4" = 1'-0"

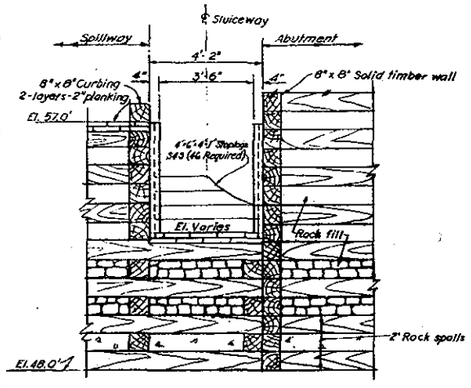


ELEVATION J-J
SCALE 1/4" = 1'-0"

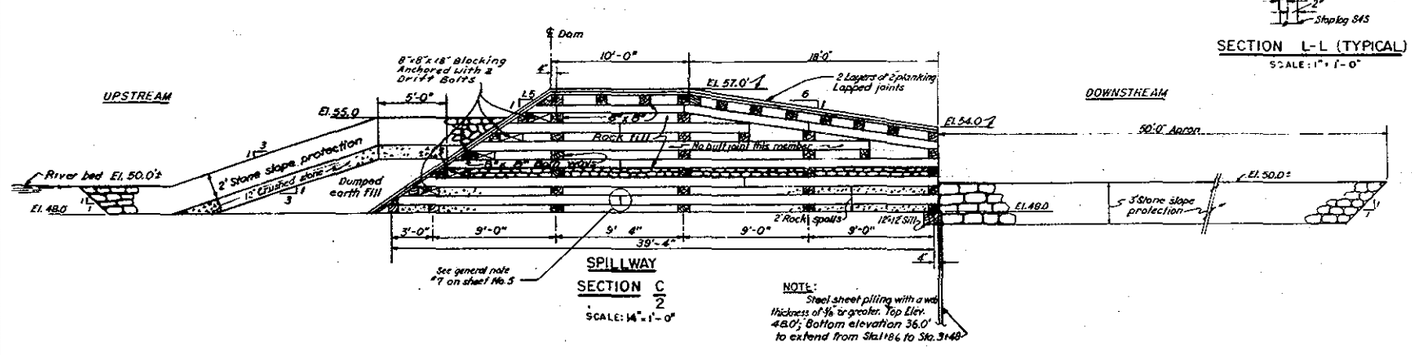
NOTE:
See general note No. 6 on sheet No. 5.



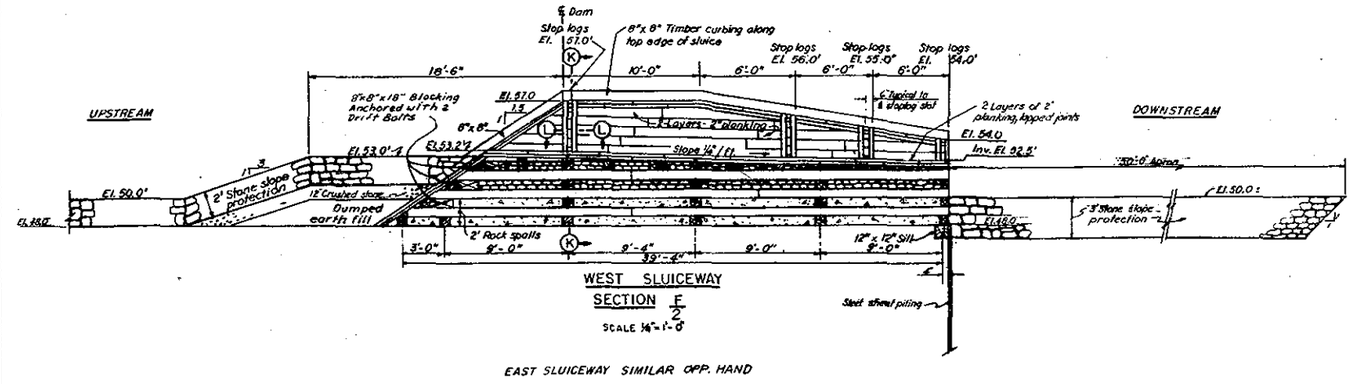
SECTION L-L (TYPICAL)
SCALE: 1" = 1'-0"



SECTION K-K (TYPICAL)
SCALE: 1/2" = 1'-0"



SPILLWAY
SECTION $\frac{C}{2}$
SCALE: 1/4" = 1'-0"



WEST SLUICEWAY
SECTION $\frac{F}{2}$
SCALE 1/4" = 1'-0"

EAST SLUICEWAY SIMILAR OPP. HAND

NOTE:
For general notes, see sheet No. 5
All timbers this sheet rough cut & full size except sluiceway stoplogs.

Record Drawing
Contract No. DA-19-016-CIVENG 61-9

GRAPHIC SCALES
1/4" = 1'-0"
1/2" = 1'-0"
1" = 1'-0"

REVISION	DATE	DESCRIPTION
	2-6-62	Final Field Corrections

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

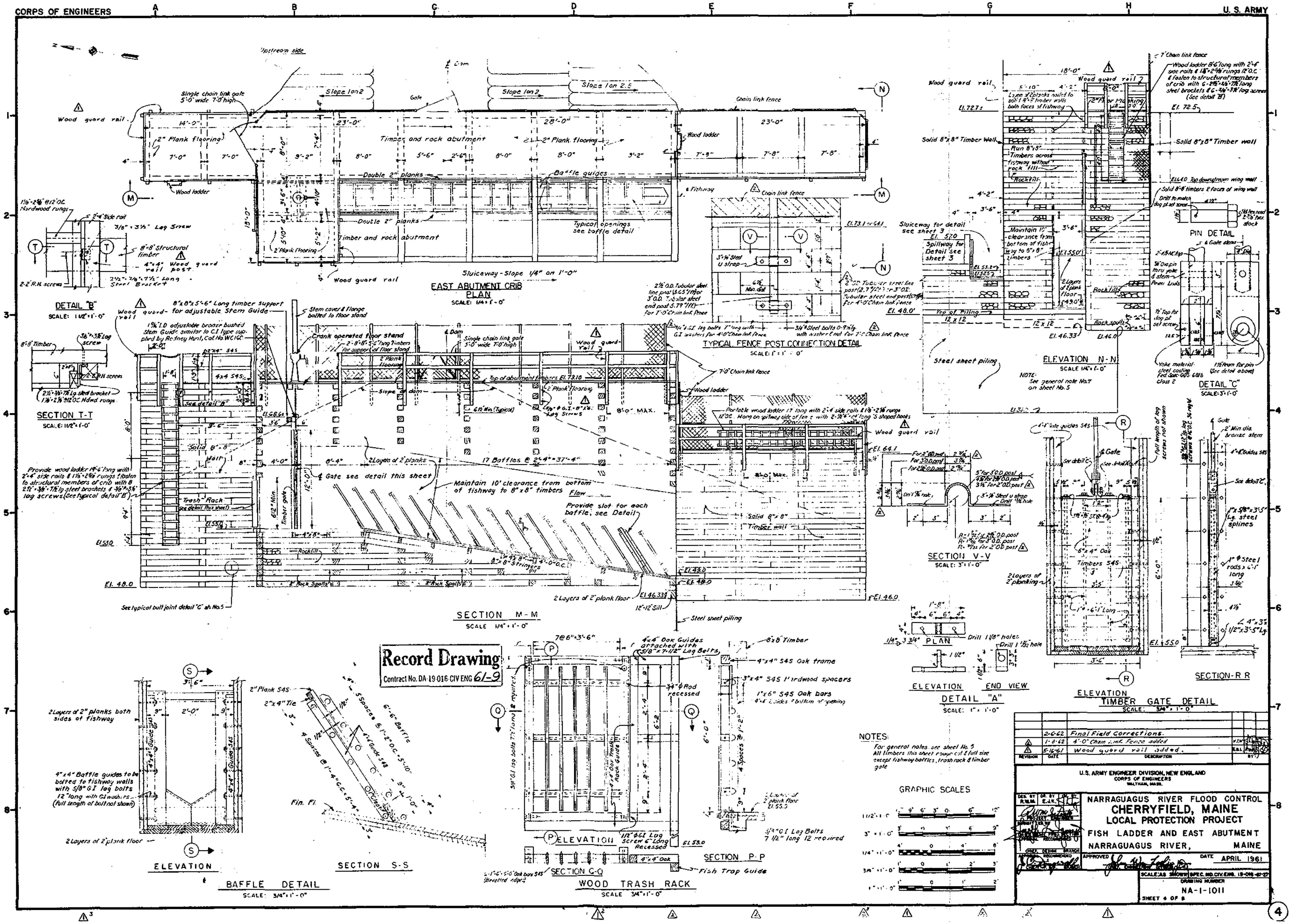
DES. BY R.W.M. | DR. BY B.G | CK. BY

NARRAGUAGUS RIVER FLOOD CONTROL
CHERRYFIELD, MAINE.
LOCAL PROTECTION PROJECT
SPILLWAY AND WEST ABUTMENT
NARRAGUAGUS RIVER, MAINE.

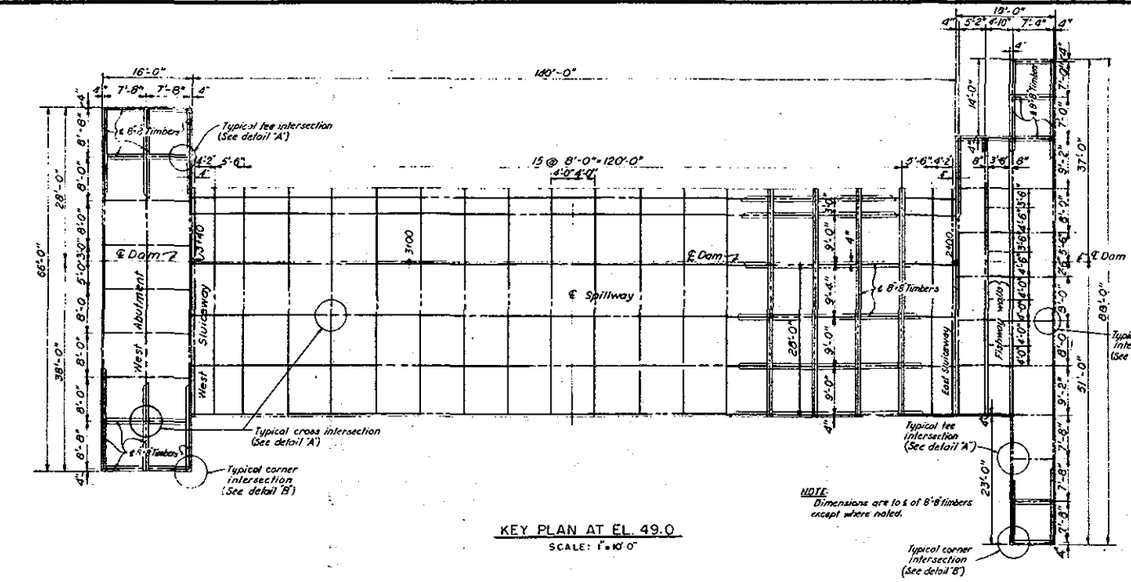
APPROVED [signature] DATE APRIL 1961

SCALES AS SHOWN | SPEC. NO. CIV. ENG. 61-016-61-27
DRAWING NUMBER
NA-1 1010
SHEET 3 OF 6

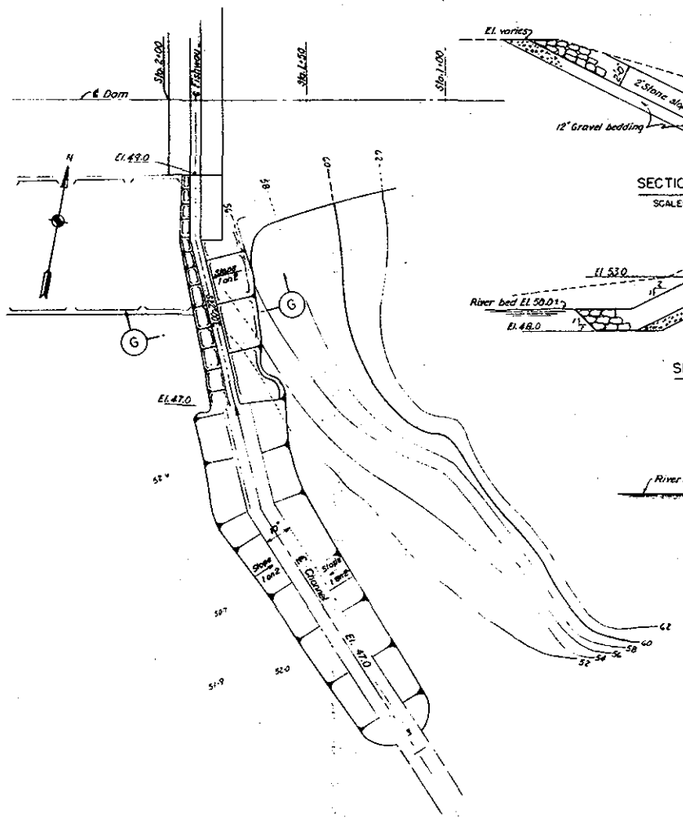
3

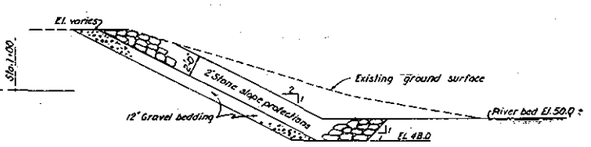

CORPS OF ENGINEERS
U. S. ARMY
Upstream side
Single chain link gate 5'-0" wide 7'-0" high
Wood guard rail
Slope 1 on 2
Slope 1 on 2.5
Gate
Chain link fence
2" Plank flooring
Timber and rock abutment
Double 2" planks
Baffle guides
Wood ladder
Typical openings see baffle detail
Sluiceway - Slope 1/4" on 1'-0"
EAST ABUTMENT CRIB PLAN
SCALE: 1/4" = 1'-0"
1 1/8"-2 5/8" @ 12" O.C. Hardwood rungs
2"x4" Side rail
3/8" x 3 1/2" Lag Screw
8"x8" Structural timber
4"x4" Wood guard rail post
2 1/2" x 3/8" x 7 1/2" Long Steel Bracket
2-2" R.H. screws
DETAIL "B"
SCALE: 1 1/2" = 1'-0"
SECTION T-T
SCALE: 1 1/2" = 1'-0"
8"x8"x5'-6" Long timber support for adjustable Stem Guide
Stem cover & flange bolted to floor stand
1 3/16" I.D. adjustable bronze bushed Stem Guide similar to C.I. type supplied by Rodney Hunt, Cat. No. WC16C
Crank operated floor stand
Top of abutment timbers El. 73.10
Slope of dam
7'-0" Chain link fence
Portable wood ladder 17' long with 2"x4" side rails & 1 1/8"-2 5/8" rungs 12" O.C. Hang on spillway side of fence with 2-1/2"x4"x4' long 'S' shaped hooks
17 Baffles @ 2'-4" = 37'-4"
Maintain 10' clearance from bottom of fishway to 8"x8" timbers
Flow
Provide slot for each baffle, see Detail
Provide wood ladder 19'-6" long with 2"x4" side rails & 1 1/8"-2 5/8" rungs & fasten to structural members of crib with 8 2 1/2"x3/8"x7 1/2" lg steel brackets & 3/8"x3 1/2" lag screws (See typical detail "B")
Trash Rack (see detail this sheet)
Gate see detail this sheet
Solid 8"x8" Timber wall
El. 48.0
See typical butt joint detail "C" sh. No. 5
2 Layers of 2" plank floor
12"x12" Sill
Steel sheet piling
SECTION M-M
SCALE 1/4" = 1'-0"
TYPICAL FENCE POST CONNECTION DETAIL
SCALE: 1" = 1'-0"
Wood ladder 8'-6" long with 2"x4" side rails & 1 1/8"-2 5/8" rungs 12" O.C. & fasten to structural members of crib with 6-2 1/2"x3/8"x7 1/2" long steel brackets & 6-3/8"x3 1/2" log screws (See detail "B")
Solid 8"x8" Timber wall
Sluiceway for detail see sheet 3
Spillway for Detail see sheet 3
Steel sheet piling
ELEVATION N-N
SCALE 1/4" = 1'-0"
NOTE: See general note No. 7 on sheet No. 5
PIN DETAIL
DETAIL "C"
SCALE: 3" = 1'-0"
SECTION V-V
SCALE: 3" = 1'-0"
DETAIL "A"
SCALE: 1" = 1'-0"
ELEVATION
TIMBER GATE DETAIL
SCALE: 3/4" = 1'-0"
SECTION-R R
Record Drawing
Contract No. DA-19-016-CIV ENG 61-9
ELEVATION
SECTION S-S
BAFFLE DETAIL
SCALE: 3/4" = 1'-0"
4"x4" Oak Guides attached with 5/8"x7-1/2" Lag Bolts
4"x4" S4S Oak frame
3"x4" S4S Hardwood spacers
1"x6" S4S Oak bars
SECTION Q-Q
SECTION P-P
Fish Trap Guide
WOOD TRASH RACK
SCALE 3/4" = 1'-0"
NOTES:
For general notes see sheet No. 5
All timbers this sheet rough cut & full size except fishway baffles, trash rack & timber gate
GRAPHIC SCALES
2-6-62 Final Field Corrections.
1-8-62 4'-0" Chain Link Fence added
5-16-61 Wood guard rail added.
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
NARRAGUAGUS RIVER FLOOD CONTROL
CHERRYFIELD, MAINE
LOCAL PROTECTION PROJECT
FISH LADDER AND EAST ABUTMENT
NARRAGUAGUS RIVER, MAINE
DATE APRIL 1961
SCALE: AS SHOWN
DRAWING NUMBER NA-1-1011
SHEET 4 OF 8
4

CORPS OF ENGINEERS — U.S. ARMY

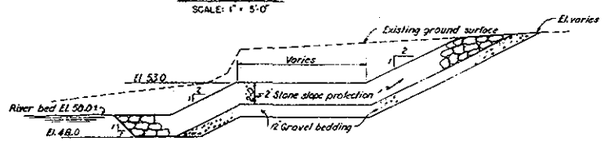


KEY PLAN AT EL. 49.0
SCALE: 1" = 10'-0"

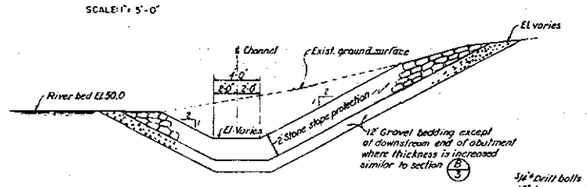




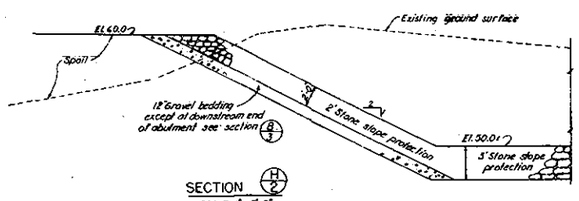
SECTION (B/2)
SCALE: 1" = 5'-0"



SECTION (F/2)
SCALE: 1" = 5'-0"



SECTION G-G (G/2)
SCALE: 1" = 5'-0"



SECTION (H/2)
SCALE: 1" = 5'-0"

B. H.-1
26-29 OCT, 1948
Ground El. 57.6'

15	SP	Gravelly med. to fine SAND w/ roots
45		
60		Silty SAND
34	SM	Silty gravelly SAND w/ some organic material
60	GM	Silty Sandy Gravel
43	SM	Gravelly Silty SAND
23	GP	Med. to fine Sandy GRAVEL
35	SP SM	Silty med. to fine SAND
36	SP	Med. to fine SAND
		NS
47	SM	Silty med. to fine SAND
154		NS
		Coarse to med SAND - El. 10.2
		DIORITE - Grey, hard, med. grained weathered to 45.0. Slight weathering along numerous joints with some secondary formation of epidote. Core in fragments to max. 6" lengths
		El. 0.5'

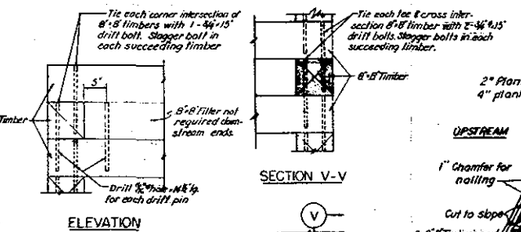
B. H.-2
29 OCT., 2 NOV, 1948.
Ground El. 62.3'

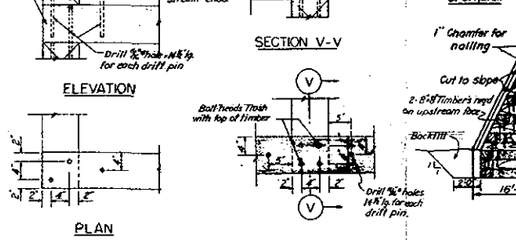
5		TOPSOIL
3		Silty fine SAND
48		
23	SM	Silty gravelly SAND (TILL)
24		Gravelly Silty SAND
33	ML	Fine Sandy Silt with stratified layers of slightly organic CLAY
34		
44	SM	Gravelly Silty SAND (probable TILL)
60		Silty SAND
22	SM	Silty med. to fine SAND w/ pockets of silty CLAY
93		
		El. 8.7
		DIORITE - Gray to dark gray hard med. grained Slight weathering along occasional joints with some secondary formation of epidote. Core in fragments to max. 6" lengths
		GRANITE - Coarse grained weathered
		El. 6.7

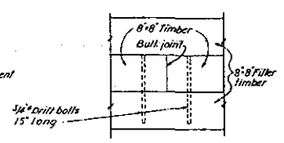
RECORD OF EXPLORATIONS

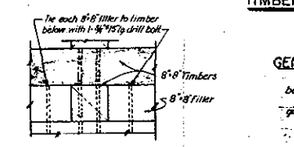
LEGEND FOR GRAPHIC LOGS
B.H.-1 Foundation Test Boring
26-29 OCT., 1948 - Date exploration performed
Ground El. 57.6' Elevation of ground surface at time of exploration referred to M.S.L.
Sub-surface Water level in boring at time of exploration
SM — Group letter symbol according to Unified Soil Classification Systems.
NS - No Samples Taken
85 — Blows per foot of penetration considered most representative for each sample drive using a 300 or 350 pound hammer with a free fall of about 18" on 1⅜" I.D. or 2" O.D. or 2" O.D. and or 2½" I.D. or 3" O.D. size sample spoon equipped with a beveled drive shoe.
El. 110 Elevation at bedrock surface
Rock Symbol
El. 0.5 Elevation at bottom of boring
Rock core recovery 0-25%
Rock core recovery 25-90%
Rock core recovery 50-75%
Rock core recovery 75-90%
Rock core recovery 90-100%

NOTE: While the borings are representive of sub-surface conditions at their respective locations and for their respective vertical reaches, local minor variations, characteristic of the overburden and rocks of this region are anticipated and if encountered, such variations will not be considered as differing materially from represented conditions.

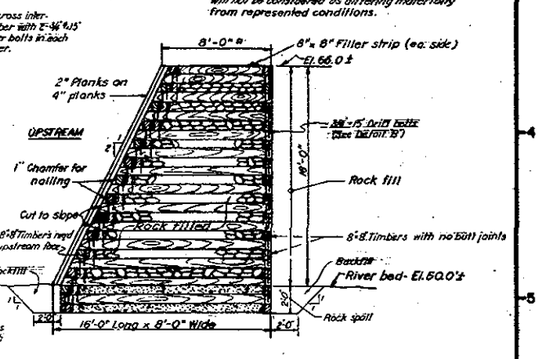








Note: Cross intersection detail similar to Detail 'A' except no fillers.



TIMBER ICE HOLDING CRIB (3 REQ'D)
SCALE: ¼" = 1'-0"

GENERAL NOTES:

1. Upstream gravel bedding & slope protection along the river banks shall be placed in the dry.
2. All timber to be creosoted with the exception of the fishway planking, battles, guides, gate, trash rack, stoplogs & sluiceway planking.
3. Double planking to have lapped joints.
4. Sides of fishway & abutments & upstream ends of abutments to have 8"x8" fillers.
5. Tie each intersection of 8"x8" timbers with ¾"x15" drift bolts driven into ¾" holes 14½" deep as shown in applicable details.
6. East-West cross timbers in both abutments to be one piece without butt joints.
7. Spillway downstream face of abutments & interior timbers of west abutments to have no fillers.
8. Where butt joints occur on exterior walls of fishway & abutments, timbers are to be bolted as shown in detail "C".
9. East-West timbers in spillway to be 16'-0" min.
10. Butt joints of timbers to be at midpoint of interior spans only. Butt joints will not occur in end spans.
11. Elevations refer to mean Sea Level Datum.

Record Drawing
Contract No. DA-19-016-CIV ENG 61-9

GRAPHIC SCALES

1" = 20'-0" 20' 0 20' 40'
1" = 5'-0" 5' 0 5' 10'
1" = 10'-0" 10' 0 10' 20'
1" = 1'-0" 1' 0 1' 2'
1/4" = 1'-0" 4" 0 4' 8'

REVISION	DATE	DESCRIPTION
	2-6-62	Final Field Corrections

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

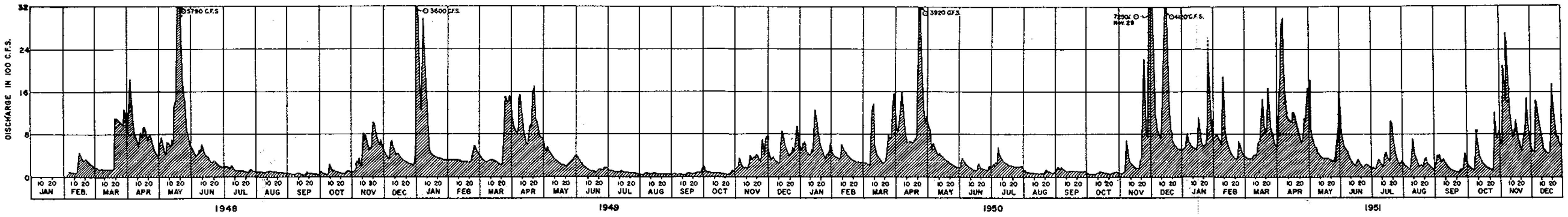
DES. BY R.N.M. | DR. BY R.G. | TR. BY | CK. BY

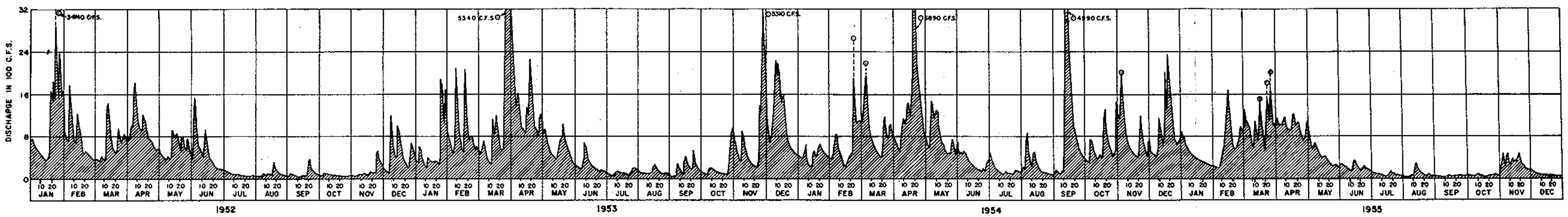
NARRAGUAGUS RIVER FLOOD CONTROL
CHERRYFIELD, MAINE
LOCAL PROTECTION PROJECT
KEY PLAN, SECTIONS & EXPLORATIONS
NARRAGUAGUS RIVER, MAINE

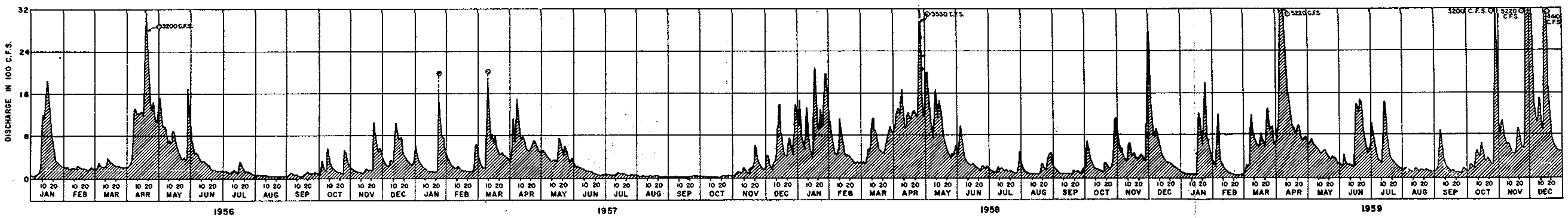
APPROVED — DATE APRIL 1961

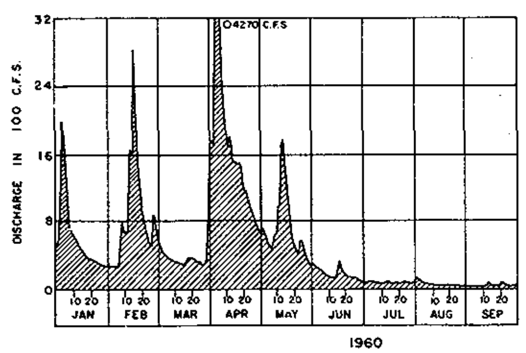
SCALE AS SHOWN | SPEC. NO. CIV. ENG. 19-016-62-127
DRAWING NUMBER
NA-1-1012
SHEET 5 OF 6

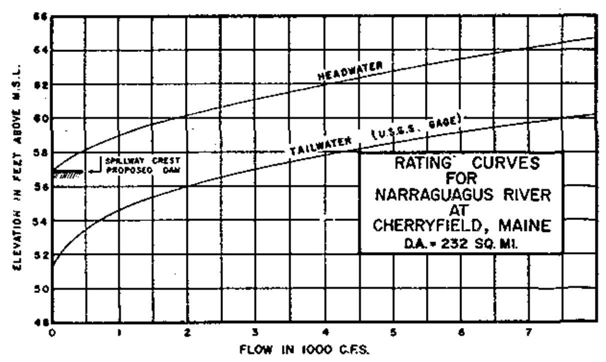
5











NOTES

1. These hydrographs are the daily average stream flow record of Narraguagus River at the U.S.G.S. gage at Cherryfield, Maine from the drainage area of 232 square miles.

2. Instantaneous peak discharges where available are shown by ⊙.

3. The data contained herein are not intended as representations or warrantees but are furnished for information only. It is expressly understood that the government will not be responsible for any deductions, interpretations or conclusions there from made by any bidder or contractor.

Record Drawing 61-9

REVISION	DATE	DESCRIPTION

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY N.L. | DR. BY C.T.M. | CK. BY N.L.

E. F. Chiu — CHIEF, HYD & HYDRO SECTION
SUBMITTED BY: [signature] CHIEF, SAIL. PROJ. SECTION
APPROVAL RECOMMENDED: CHIEF, DESIGN BRANCH
APPROVAL RECOMMENDED: [signature] CHIEF, E. ENG. BRANCH

NARRAGUAGUS RIVER FLOOD CONTROL
CHERRYFIELD, MAINE
LOCAL PROTECTION PROJECT
HYDROGRAPHS AND RATING CURVES
NARRAGUAGUS RIVER MAINE

APPROVED: [signature] CHIEF, ENGINEERING DIVISION
DATE APRIL 1961

SCALE NO SCALE | SPEC. NO. CIV. ENG. 19-016-61-27
DRAWING NUMBER NA-1-1013
SHEET 6 OF 6